
E.164/ESN Numbering Plan Expansion

The E.164/ESN Numbering Plan Expansion feature provides the capabilities to meet the International Telegraph and Telephone Consultative Committee (CCITT) recommendation E.164 for Integrated Services Digital Network (ISDN) and Public Switching Telephone Network (PSTN) dialing.

Generally, the following enhancements are offered by this feature:

- the support of the numbering plan for ISDN and PSTN dialing has been increased to a 15-digit maximum, from a 12-digit maximum;
- the removal of the leftwise-unique restriction imposed on ESN Supplemental Digit Restriction and Recognition (SDRR) entry codes. For example, if 555 is an existing entry, a new entry of either 55 or 5551212 can be entered;
- the addition of “allow” (ALLOW) as a new Supplemental Digit Restriction and Recognition (SDRR) entry type in LD 90. There are now nine entry types for Supplemental Digit Restriction and Recognition. One entry type (DENY), denies a call from going through if the digits in the SDRR entry match the dialed digits. There are seven other entry types that provide special treatments, if the digits in the SDRR entry match the dialed digits. The new ALLOW entry allows a call to go through, if the dialed digits did not match any entry within the Supplemental Digit Restriction and Recognition table;

- the Special Number Translation (SPN) screening digits scheme is changed; and
- the capability of the Meridian 1 base features to store digits is increased to 31 digits.
- the capability to send up to 32 digits to the Extended Conference and Tone & Digit Switch card, allowing an International Number to be sent in a single Automatic Number Identification (ANI) message. Previously, only 16 digits could have been outpulsed in a single ANI message, which included the start digit, the end digit, and an optional information digit. This left only 13 or 14 digits of the actual International Number to be outpulsed in a single ANI message. This meant that the International Number may have been sent in two separate ANI messages.

The specific enhancements delivered by the E.164/ESN Numbering Plan Expansion feature are provided in the tables that follow.

Summary of new ESN functionalities

Table 33 summarizes the changes made to the ESN functionality. Please note that the components that are not affected are not listed.

Table 33
Summary of ESN changes.

Component	Old	New
Maximum number of digits for a Special Numbering Translation screening.	11	19
Maximum number of Digit Manipulation Index (DMI) deletion digits.	15	19
Maximum number of Digit Manipulation Index (DMI) insertion digits.	24	31
Maximum number of Supplemental Digit Restriction and Recognition (SDRR) tables, with BARS.	256	1500
Maximum number of Supplemental Digit Restriction and Recognition (SDRR) tables, with NARS.	512	1500
Maximum number of words per Supplemental Digit Restriction and Recognition (SDRR) entry.	3	4
Maximum number of digits in each Supplemental Digit Restriction and Recognition (SDRR) entry.	7	10
Maximum length of Flexible Numbering Plan (FNP) Flexible Digit Number Length (FLEN) numbers for Special Number Translation (SPN).	16	24
Maximum length of Flexible Numbering Plan (FNP) Flexible Digit Number Length (FLEN) numbers for Trunk Steering Codes (TSCs).	16	24
Maximum number of digits per Free Special Number Screening (FSNS) Special Number.	11	19
Total number of digits for screening under Free Special Number Screening (FSNS).	14	22

Maximum number of possible Supplemental Digit Restriction and Recognition (SDRR) entry types.	8	9 ('ALLOW' is added).
Restriction imposed on Supplemental Digit Restriction and Recognition (SDRR) entry codes.	Leftwise Unique.	ALLOW is a new entry type in LD 90. This entry allows a call to go through, as if the dialed digits did not match any entry within the Supplemental Digit Restriction and Recognition table. None. The leftwise-unique restriction, imposed on SDRR entry codes, is removed. For example, if 555 is an existing entry, a new entry of either 55 or 5551212 can be entered.

Summary of Meridian 1 base features enhancements

Table 34 summarizes the changes made to the base Meridian 1 features functionality. Please note that the components that are not affected are not listed.

Table 34
Summary of Meridian 1 base features changes.

Component	Old	New
Maximum number of digits for an Autodial entry. Note that this enhancement does not apply to M3000 sets.	23	31
For the No Hold Conference functionality, the maximum number of digits for a Conference Autodial target DN entry.	23	31
Maximum number of digits for the Call Forward All Calls DN. Note that this enhancement does not apply to M2317 and M3000 sets.	23	31
Maximum number of digits for the Internal Call Forward DN.	23	31
For the Phantom DN functionality, the maximum number of digits for the Default Call Forward DN.	23	31
Maximum number of digits for the Customer Call Forward DN.	16	23
Maximum number of digits sent in an ANI message.	16	32

Summary of Automatic Call Distribution (ACD) enhancements

Table 37 summarizes the changes made to the ACD functionality. Please note that the components that are not affected are not listed.

Table 35
Summary of Meridian 1 ACD changes.

Component	Old	New
Maximum number of digits for the ACD Night Forward DN.	23	31
Maximum number of digits for the ACD Interflow DN.	23	31

Summary of Customer Controlled Routing (CCR) enhancements

Table 36 summarizes the changes made to the Customer Controlled Routing functionality. Please note that the components that are not affected are not listed.

Table 36
Summary of CCR changes.

Component	Old	New
Maximum number of Termination DN digits in the CCR ITR To-Route-A-Call message.	24	31

Summary of ISDN features enhancements

Table 37 summarizes the changes made to the ISDN functionality. Please note that the components that are not affected are not listed.

Table 37
Summary of ISDN changes.

Component	Old	New
For ISDN BRI basic call service line access (BRIL), the maximum number of Called Party Information Element digits.	24	31
For the ISDN QSIG interface, the maximum number of Called Party Information Element digits.	24	31
For the ISDN BRI NI-1 Call Forward All Calls feature, the maximum number of digits for the forward DN.	20	31

Operating parameters

All existing operating parameters that apply to the Meridian 1 ESN functionality, base system features and ISDN PRI and ISDN BRI networking features apply to the E.164/ESN Numbering Plan Expansion feature.

The enhancements introduced by the E.164/ESN Numbering Plan Expansion feature, pertaining to Called Party Information Element digits (CDPN), and forwarded and redirected DNs do not pertain to the M5317 and M5209 ISDN BRI terminals.

The 31-digit expansion, pertaining to the Call Forward All Calls DN, does not apply to Meridian M2317 and M3000 sets, since their firmware limits entering a CFAC DN from the set to a maximum of 23 and 28 digits, respectively.

An Autodial key cannot be configured on a Meridian M3000 set; instead, the M3000 sets are equipped with a private directory, which allows automatic dialing of a stored DN entry by touching the corresponding name on the set's display screen. Since the firmware of the M3000 limits the length of a DN entry to a maximum of 28 digits, the 31-digit expansion pertaining to the Autodial does not apply to Meridian M3000 sets.

Since the Network Call Trace feature can outpulse a maximum of 21 digits to be printed on the TTY, the 31-digit expansion does not apply to Network Call Trace.

The 16 digit maximum, pertaining to the Calling Party Number, Connected Party Number, Redirecting Number and Redirection Number, has not been expanded by the E.164/ESN Numbering Plan Expansion feature.

If all the digits of a DN are dialed automatically, such as for a Speed Call or for any redial feature, only the first 31 digits are processed. This means that any digits that are inserted by, for example, network signaling, pretranslation or digit manipulation, are counted as part of these 31 digits. Therefore, even fewer than the automatically dialed digits may be processed.

Flexible Feature Codes (FFC) DN's may have a length of 1-7 digits. Call Forward All Calls (CFAC), Internal Call Forward All Calls (ICF) and Remote Call Forward (RCFW) are supported by FFCs, and can be activated, deactivated and verified using FFCs. When activating CFAC, using the Remote Call Forward FFC (RCFA), or when verifying the Call Forward DN, using the Call Forward All Call FFC (CFWV), the Remote Call Forward FFC (RCFV), or the Internal Call Forward All Calls FFC (ICFV), the FFC DN is kept, using eight of the available 31 digits. For the CFAC DN or ICF DN, this means that only 23 possible digits can be stored or verified using FFCs. As a result, this limitation does not accommodate the 31 digit CFAC DN and ICF DN expansion, introduced by the E.164/ESN Numbering Plan Expansion feature.

Calling Party Privacy (CPP) allows a caller to block his or her name from appearing on the called party display. The call is marked as a CPP call by entering a CPP FFC, up to seven digits long. This means that up to seven additional digits may have to be stored for automatic dialing. These digits are stored in sequence, and subsequent digits may not be processed.

In the case of CPP outpulsing, the CPP outpulsed digits (typically *67 or 1167) are stored after CPP has been activated. If this call goes over a trunk, the CPP outpulsed digits are sent to the far end to indicate that the call is a CPP call. For ISDN calls, a CPP flag is marked in the ISDN message. For non-ISDN CPP calls, digits that are already stored, such as for Call Forward, Autodial, and Speed Call, may be pushed out when the CPP digits are inserted, since only 31 digits can automatically be processed. This means that up to four digits may be removed from the digits that are outpulsed.

The System Access Enhancement (SAE) feature impacts the accepted values for the Call Forward All Calls DN, and the Internal Call Forward DN, when entered in LD 10 and LD 11. This feature allows all values between 4-31 to be accepted, rather than the normal accepted values of 4, 8, 12, 16, 20, 24, 28, 31. Also, the default is 4, rather than 16.

The Called Party Information Elements expansion, provided by the E.164/ESN Numbering Plan Expansion feature, applies to ISDN QSIG GF Transport feature.

Feature interactions

The E.164/ESN Numbering Plan Expansion feature does not interact with the Meridian 1 base system features and ISDN PRI and BRI networking features, other than as described in Table 33 to Table 37 and in the operating parameters.

Feature packaging

The E.164/ESN Numbering Plan Expansion feature does not introduce a new package. However, the following packages are required to support the new expansions.

For ESN expansions:

- Basic Alternate Route Selection (BARS) package 57;
- Network Alternate Route Selection (NARS) package 58; and
- Flexible Numbering Plan (FNP) package 160.

For ISDN expansions:

- Digit Display (DDSP) package 19;
- Integrated Services Digital Network (ISDN) package 145;
- 1.5 Mbps Primary Rate Access (PRA) package 146;
- Integrated Service Digital Network Signaling Link (ISL) package 147;
- Meridian 1 Extended Peripheral Equipment (XPE) package 203;
- Basic Rate Interface (BRI) package 216;
- Multi-purpose Serial Data Link (MSDL) package 222;
- Basic Rate Interface Line Application (BRIL) package 235; and
- QSIG Interface (QSIG) package 263.

For base system features expansions:

- Optional Features (OPTF) package 1;
- 2500 Telephone Features (SS25) package 18;
- Automatic Call Distribution (ACD) package 40;
- Automatic Call Distribution Advanced (ACD) package 41;
- Automatic Call Distribution Basic (ACD) package 45;
- 500 Telephone Features (SS5) package 73;
- Controlled Class of Service (CCOS) package 81;
- Background Terminal (BGD) package 99;
- Flexible Feature Codes (FFC) package 139; and
- Phantom Terminal Numbers (PHTN) package 254.

Feature implementation

The following steps are used to configure the E.164/ESN Numbering Plan Expansion enhancements:

- In LD 10, for analog (500/2500 type) sets, configure the expansion pertaining to the maximum length of Autodial, Call Forward All Calls, Default Call Forward (for Phantom TNs) and Internal Call Forward DN;
- In LD 11, for Meridian 1 proprietary sets, configure the expansion pertaining to the maximum length of Autodial, Conference-Autodial, Call Forward All Calls and Internal Call Forward DN;
- In LD 12, for attendant consoles, configure the expansion pertaining to the maximum length of the Autodial DN;
- In LD 15, configure the expansion pertaining to the maximum length of the Customer Call Forward DN;
- In LD 23, configure the expansion pertaining to the maximum length of the ACD Night Call Forward DN and the ACD Interflow DN;
- In LD 86, for the ESN data block, configure the expansion pertaining to the maximum number of Digit Manipulation tables, and maximum number of Supplemental Digit Restriction and Recognition blocks;
- In LD 86, for the Digit Manipulation data block, configure the expansion pertaining to the maximum number of leading digits to be deleted and inserted;
- In LD 87, for a Free Special Number Screening Index, configure the expansion pertaining to the maximum number of Special Numbers to be screened;
- In LD 87, for a Trunk Steering Code, configure the expansion pertaining to the maximum number of Flexible Numbers;
- In LD 90, for Network Translation tables, configure the expansion pertaining to the maximum number of Special Numbers digits, the maximum number of digits for Flexible Numbers, the maximum number of Supplemental Digit Restriction and Recognition digits per entry and the addition of “allow” as a new Supplemental Digit Restriction and Recognition type.

LD 10 — For analog (500/2500 type) sets, configure the expansion pertaining to the Autodial, Call Forward All Calls, Default Call Forward (for Phantom TNs) and Internal Call Forward DN.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	500	Type of telephone set.
TN	I s c u c u	Loop, shelf, card and unit for Options 51C, 61C, 81, 81C. Card and unit for Option 11C.
...		
FTR		Special features for telephone sets.
	CFW (4)-31	Enter the maximum number of digits in the Call Forward All Calls DN. Note that there is no default value.
	DCFW II xxx...x	Enter the maximum number of digits in the Default Call Forward DN for a Phantom DN. II = 4,8,12,16,20,24,28,31 (entries are rounded up to the next valid length.) xx...x = the Default Call Forward All Calls DN.
	ICF (4)-31	Enter the maximum number of digits in the Internal Call Forward DN for a Phantom DN.
	...	

LD 11 – For Meridian 1 proprietary sets, configure the expansion pertaining to the Autodial, Call Forward All Calls, Default Call Forward (for Phantom TNs) and Internal Call Forward DN.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	xxxx	Type of telephone set. xxxx = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2116, 2317, 2616, M3000.
TN	l s c u c u	Loop, shelf, card and unit for Options 51C, 61C, 81, 81C. Card and unit for Option 11C.
KEY	nn ADL ll xxx...x	Telephone function key assignments. Enter the maximum number of Autodial digits that may be stored. nn = Key number ll = 4, 8, 12, (16), 20, 24, 28, 31, NUL (for M3000 sets, the accepted range is (4)-28) Entries are rounded up to the next valid length. An entry of NUL will disable the Autodial feature xx...x = the Autodial target DN (this is an optional entry.)
	nn CA ll xxx...x	Enter the maximum number of digits that may be stored for the combined Conference-Autodial DN. nn = Key number ll = 4, 8, 12, (16), 20, 24, 28, 31 (entries are rounded up to the next valid length.) xx...x = the Conference-Autodial target DN (this is an optional entry.)
	nn CFW ll xxx...x	Enter the maximum number of digits that may be stored for the Call Forward All Calls DN. nn = Key number ll = (4)-31 (for M2317 and M3000 sets, the accepted range is (4)-23) xx...x = the Call Forward All Calls DN (this is an optional entry.)

	nn ICF ll xx...x	Enter the maximum number of digits that may be stored for the Internal Call Forward DN. nn = Key number ll = (4)-31 xx...x = the Internal Call Forward DN (this is an optional entry.)
	...	

LD 12 – For attendant consoles, configure the expansion pertaining to the maximum length of the Autodial DN.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	xxxx	Type of attendant console xxxx = 1250, 2250.
TN	l s c u c u	Loop, shelf, card, and unit for Options 51C, 61C, 81, 81C. Card and unit for Option 11C.
KEY	nn ADL xxx...x	Attendant console function key assignments. Enter the maximum number of Autodial digits that may be stored. nn = Key number xxx...x = the Autodial DN, up to 31 digits (this is an optional entry.)
	...	

LD 15 - Configure the expansion pertaining to the Customer Call Forward DN.

Prompt	Response	Description
REQ:	NEW, CHG	Add new data, or change existing data.
TYPE	RDR	Redirection data.
CUST	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
...		
- CCFWDN	xxx...x X	Enter the Customer Call Forward DN, up to 23 digits (this entry is made for a new CCFWDN, or if the length of an existing CCFWDN has been expanded.) Enter X for no entry.
...		

LD 23 - Configure the expansion pertaining to the ACD Night Call Forward DN and the ACD Interflow DN.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
TYPE	RDR	Call Detail Recording data.
CUST	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
ACDN	xxx...x	ACD DN.
...		
NCFW	xxx...x	Enter the ACD Night Forward DN, up to 31 digits (this entry is made for a new Night Forward DN, or if the length of an existing Night Forward DN has been expanded.)
...		
IFDN	xxx...x	Enter the ACD Interflow DN, up to 31 digits (this entry is made for a new Interflow DN, or if the length of an existing Interflow DN has been expanded.)

LD 86 - For the ESN data block, configure the expansion pertaining to the maximum number of Supplemental Digit Restriction and Recognition blocks, and the maximum number of Digit Manipulation tables.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
CUST	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
FEAT	ESN	ESN data block feature.
...		
MXSD	(0)-1500	Enter the maximum number of Supplemental Digit Restriction and Recognition (SDRR) blocks, for BARS or NARS. Enter 0 (the default) if no SDRR blocks are required.
...		
MXDM	(0)-1000 (0)-256 (0)-32	Enter the maximum number of Digit Manipulation tables. (0)-1000 = for Flexible Numbering Plan (0)-256 = for BARS/NARS (0)-32 = for Coordinated Dialing Plan Enter 0 (the default) if no Digit Manipulation tables are required.
...		

LD 86 - For the Digit Manipulation data block, configure the expansion pertaining to the maximum number of leading digits to be deleted and inserted.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
CUST	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
FEAT	DGT	Digit Manipulation data block feature.
...		
DMI	1-999 1-255 1-31	Enter the Digit Manipulation table. 1-999 = for Flexible Numbering Plan 1-255 = for BARS/NARS 1-31 = for Coordinated Dialing Plan. The maximum number of Digit Manipulation tables is defined using prompt MXDM, in the ESN data block.
DEL	(0)-19	Enter the number of leading digits to be deleted. Enter 0 (the default) for none.
INST	x...x x...x*y...y X	Enter the number of leading digits to be inserted. x...x = 1-31 x...x*y...y = for Special Common Carriers (SCCs), 1-30, including access number (x...x), delimiter (*), and authorization code (y...y) Enter X for none.
...		

LD 87 - For a Free Special Number Screening Index, configure the expansion pertaining to the maximum number of Special Numbers to be screened.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
CUST	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
FEAT	FSNS	Free Special Number Screening.
FSNI	1-255	Free Special Number Screening Index.
SPN	1-19	Special Number to be screened.
...		

LD 87 - For a Trunk Steering Code, configure the expansion pertaining to the maximum number of Flexible Numbers.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
CUST	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
FEAT	CDP	Coordinated Dialing Plan.
TYPE	TSC	Trunk Steering Code.
TSC	1-7	Trunk Steering Code.
- FLEN	0-24	Flexible Number.
...		

LD 90 - For Network Translation tables, configure the expansion pertaining to the maximum number of Special Numbers digits, the maximum number of digits for Flexible Numbers, the maximum number of Supplemental Digit Restriction and Recognition digits per entry, and the addition of “allow” (ALLOW) as a new Supplemental Digit Restriction and Recognition type.

Prompt	Response	Description
REQ	NEW, CHG	Add new data, or change existing data.
CUST	0-99 0-31	Customer Number for Options 51C, 61C, 81, 81C. Customer Number for Option 11C.
FEAT	NET	Network Translation Tables data.
...		
TYPE	SPN	Special Number Translation.
SPN	xxxx xxxx x...x	Enter the Special Number Translation digits. Up to 19 digits may be entered. The SPN digits must be entered in groups of at most four digits, separated by a space. Up to five groups can be entered. The restriction is removed of allowing one less digit if the first digit of a digit string is not “1”.
- FLEN	(0)-24	Enter the number of Flexible Digits (the number of digits that the system expects to receive before accessing a trunk, and outpulsing the digits.)
...		
- SDRR	DENY LDID LDDD DID DDD ITED ARRN STRK ALLOW	Type of Supplemental Digit Restriction and Recognition. DENY = restricted codes. LDID = recognized local DID codes. LDDD = recognized local DDD codes. DID = recognize remote DID codes. DDD = recognize remote DDD codes. ITED = incoming trunk group exclusion digits. ARRN = alternate routing remote number. STRK = allowed codes for ADM/MDM. ALLOW = allowed codes.

		The maximum number of digits entered in response to the DENY, LDID, LDDD, DID, DDD and ALLOW prompts, which follow, must be lesser than 10, or 7-m (8-m for 1+ dialing) for Central Office translation data (NXX), 10-m (11-m for 1= dialing) for Numbering Plan Area Code translation data (NPA), or 19-m for Special Numbers Translation data (SPN), where m = the number of digits entered for the prompt NXX, NPA or SPN. These numbers are no longer required to be leftwise unique. For non leftwise unique numbers, the longer number takes precedence over the shorter number. However, the exact same numbers (non leftwise unique and the same length) are still blocked.
-- DENY	x...x	Restricted number to be denied.
-- LDID	x...x	Local DID number to be recognized.
-- LDDD	x...x	Local DDD number to be recognized.
-- DID	x...x	Remote DID number to be recognized.
-- DDD	x...x	Remote DDD number to be recognized.
-- ALLOW	x...x	Code to be allowed.

Feature operation

There are no specific operating procedures required to use this feature.